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☐ 1. Document ID: US 20030068084 A1

L6: Entry 1 of 14 File: PGPB Apr 10, 2003

DOCUMENT-IDENTIFIER: US 20030068084 A1
TITLE: Image processing method

Detail Description Paragraph (106):
[0169] The image processings include the red-eye correction processing, gray balance adjustment, gradation correction and density (brightness) adjustment each using a lookup table (LUT), correction of a light source for use in a photographing operation and saturation adjustment (color adjustment) using a matrix (MTX), an averaging processing by arbitrarily combining a low-pass filter, an adder, an LUT and an MTX, an electronic magnification varying processing which is performed by carrying out an interpolating processing, a dodging process (compression/expansion of the dynamic range of the density) and a sharpness (sharpening) processing.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 2. Document ID: US 20030053158 A1

L6: Entry 2 of 14 File: PGPB Mar 20, 2003

DOCUMENT-IDENTIFIER: US 20030053158 A1
TITLE: Image reading device

Detail Description Paragraph (4):
[0032] The image processor 12 subjects the image data to image processing for correction of plural kinds, the image data being output by the CCD scanner 11. Upon pre-scanning, the image processor 12 effects arithmetic operation of a reading condition for fine scanning by calculation of image data obtained by the pre-scanning. According to the reading condition, an original image in the photo film is finely scanned, and subjected to image processing. After this, the image data is output to the laser printer component 14 as recording image data. Examples of the image processing are gray balance adjustment, gradation correction, density adjustment (brightness adjustment), light source type correction of a light source according to a matrix (MTX), chroma adjustment of an image (color adjustment), and the like. Other examples of the image processing are electronic zooming processing, image dodging processing (compressing and extending of density dynamic range), and sharpness processing. For the purpose of processing of those, various elements are used, including a low-pass filter, adder, look-up table memory (LUT), matrix (MTX) and the like. Those are suitably combined with one another, to effect averaging, and interpolating calculation.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 3. Document ID: US 20020122216 A1

L6: Entry 3 of 14 File: PGPB Sep 5, 2002

DOCUMENT-IDENTIFIER: US 20020122216 A1
TITLE: Image reader for reading an image recorded on an original

Detail Description Paragraph (4):
[0026] The image processing unit 12 executes various image processing of correction and so forth on image data outputted from the CCD scanner 11. At the time of pre-scanning, the image processing unit 12 determines read conditions for fine scanning on the basis of the image data. Under the determined read conditions, fine scanning is performed for the image of the photographic film. After image processing, the image is outputted to the laser printer 14 as image recording data. As to the image processing, there are gray-balance adjustment, gradation correction, density (brightness) adjustment, light-source correction based on matrix (MTX), and saturation adjustment (color adjustment) of the image. In addition, are executed an electronic process for varying magnification, a dodging process (compression/expansion for a dynamic range of density), a sharpness process, and so forth. In these processes, a low-pass filter, an adder, an LUT, MTX and so forth are used, and by properly combining them, a mean process, an interpolation operation and so forth are also executed.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☑ 4. Document ID: US 6563531 B1

L6: Entry 4 of 14 File: USPT May 13, 2003

DOCUMENT-IDENTIFIER: US 6563531 B1
TITLE: Image processing method

Detailed Description Text (34):
The image processing block 66B is the site of performing various image processing steps to the image data. Image processing steps performed in the image processing block 66B are by no means limited in any particular way and various image processing steps performed in known image processing apparatus such as color balance adjustment, gradation adjustment, density adjustment, saturation adjustment, electronic magnification, dodging (compressing/extending the density's dynamic range), sharpening (sharpness correction) and the like are exemplified. These processing steps are performed using LUT, matrix (MTX) operations, a low-pass filter and an adder, or using known means such as averaging and interpolation operation and the like.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☑ 5. Document ID: US 6560357 B1

L6: Entry 5 of 14 File: USPT May 6, 2003

DOCUMENT-IDENTIFIER: US 6560357 B1
TITLE: Color correcting method and image reading apparatus

Detailed Description Text (62):
The image processing carried out in the image processing section 56 is not limited, and various kinds of image processing executed in known image processing apparatuses are exemplified such as, for example, color balance adjustment, gradation adjustment, density adjustment, saturation adjustment, electronic magnification, dodging processing (compression/expansion of the dynamic range of densities), sharpness processing and the like. The processing can be carried out by a known means such as a LUT, matrix operation unit, filter, adder and the like or a means using averaging processing, interpolating operation and so on which are executed by suitably combining the above means.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

6. Document ID: US 6480625 B1

L6: Entry 6 of 14 File: USPT Nov 12, 2002

DOCUMENT-IDENTIFIER: US 6480625 B1
TITLE: Methods for correcting density characteristic and color

Detailed Description Text (46):
The image processing carried out in the above-mentioned image processing subsection 50B is not limited to any particular way, and various kinds of image processing executed in known image processing apparatuses are exemplified such as, for example, color balance adjustment, gradation adjustment, density adjustment, saturation adjustment, electronic magnification, dodging processing (compression/expansion of the dynamic range of densities), sharpness processing and the like. Each of these processing operations may be performed by a known means such as an LUT, a matrix operator, a filter, an adder and the like including a means of an appropriate combination of the above means such as an averaging processing, an interpolating operation or the like.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

7. Document ID: US 6480300 B1

L6: Entry 7 of 14 File: USPT Nov 12, 2002

DOCUMENT-IDENTIFIER: US 6480300 B1
TITLE: Image processing apparatus, image processing method and recording medium on which software for executing the image processing is recorded

Detailed Description Text (38):
The image processing subsection 54 subjects the image data, which has been captured by the scanner 12 under the image processing conditions set by the condition setting section 48 to be described later and stored in the fine scan memory 42, to various kinds of image processing. The various kinds of the image processing includes color balance adjustment, gradation adjustment, color adjustment, density adjustment, saturation adjustment, electronic magnification, frequency processing such as sharpness enhancement (edge enhancement for sharpening the edge), dodging (compressing/extending the density's dynamic range), creation of a soft-focused image, gain adjustment by executed by frequency bands, determination of an image density, and the like by means of a LUT, a MTX operation unit, a lowpass filter, an adder/subtracter, and the like. As a result, the image data can be reproduced on a color paper as a color image or a color soft-focused image, which is the object of

the present invention, each having a desired density, gradation and tone. The details of the above image processing steps will be described later.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☑ 8. Document ID: US 6470101 B1

L6: Entry 8 of 14 File: USPT Oct 22, 2002

DOCUMENT-IDENTIFIER: US 6470101 B1
TITLE: Image reading method

Detailed Description Text (40):
The image processing steps are exemplified by gray balance adjustment, tone (gradation) correction, density (lightness) adjustment and so forth which are each performed using LUTs (look-up tables), correction for the kind of light source used in taking the picture and saturation (color) adjustment of images which are each performed by matrix (MTX), and other processing steps such as electronic magnification, dodging (compressing/extending the dynamic range of the density) and sharpening (sharpness correction) which are each performed using any one of a low-pass filter, an adder, LUT, MTX and the like or using averaging processing, interpolation operations and the like that are brought about by appropriately combining the above mentioned devices such as the low-pass filter, the adder, LUT and MTX.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 9. Document ID: US 6226070 B1

L6: Entry 9 of 14 File: USPT May 1, 2001

DOCUMENT-IDENTIFIER: US 6226070 B1
TITLE: Image processing method

Detailed Description Text (55):
The image processing steps are exemplified by gray balance adjustment, tone (gradation) correction, density (lightness) adjustment and so forth which are each performed using LUTs (look-up tables), correction for the kind of light source used in taking the picture and saturation (color) adjustment of images which are each performed by matrix (MTX), and other processing steps such as electronic magnification, dodging (compressing/extending the dynamic range of the density's dynamic range), sharpening (sharpness correction) and the like which are each performed using either any one of a low-pass filter, an adder, LUT, MTX and the like or averaging, interpolation operations and the like by means of any appropriate combinations thereof.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☑ 10. Document ID: US 6101273 A

L6: Entry 10 of 14 File: USPT Aug 8, 2000

DOCUMENT-IDENTIFIER: US 6101273 A
TITLE: Image reproducing method and apparatus

Detailed Description Text (4):
The image processing section 1B comprises an amplifier 10 for amplifying the R, G, and B three color image signals, which have been detected by the CCD image sensor 8, and an analog-to-digital converter 11 for converting the amplified image signals into digital image signals. The image processing section 1B also comprises a look-up table (LUT) 12 for converting the digital image signals into image density signals, and frame memories 13R, 13G, and 13B, which respectively store the R, G, and B digital image signals having been converted into the image density signals. The image processing section 1B further comprises frame memories 14R, 14G, and 14B for respectively storing R, G, and B preliminary read-out image signals S.sub.P, which are obtained in cases where the preliminary read-out operation is carried out. The image processing section 1B still further comprises an LUT 15 for carrying out correction of gray balance, brightness, and gradation, which will be described later, on the digital image signals, and a matrix (MTX) 16 for correcting the image signals, which have been obtained from the processing carried out by the LUT 15, such that they may become the color signals capable of being reproduced in appropriate colors on a photosensitive material, which will be described later. The image processing section 1B also comprises an MTX 17 for converting the image signals, which have been corrected by the MTX 16, into a luminance, and a low-pass filter (LPF) 18 for forming an unsharp signal from the luminance. The image processing section 1B further comprises an LUT 19 for compressing the dynamic range of the unsharp signal and thereby obtaining an unsharp image signal for the adjustment of the large area contrast, and an adder 20 for adding the original image signals and the unsharp image signal, which has been obtained from the dynamic range compressing process, to each other and thereby obtaining addition signals Sadd. The image processing section 1B still further comprises an LUT 21 for correcting the contrast (i.e., the large area contrast and the high frequency contrast) of the addition signals Sadd, i.e. for carrying out a gradation processing, and a digital-to-analog converter 22 for converting the signals, which have been obtained from the contrast correction, into analog signals. The image processing section 1B also comprises an LUT 23 for correcting the gradation of the preliminary read-out image signals S.sub.P, and a digital-to-analog converter 24 for converting the preliminary read-out image signals S.sub.P, which have been obtained from the gradation correction carried out by the LUT 23, into analog signals. The image processing section 1B further comprises a CRT display device 25 for reproducing a visible image from the preliminary read-out image signals S.sub.P having been obtained from the digital-to-analog conversion, and a mouse device 26 for operating the visible image, which is displayed on the CRT display device 25, in order to set ultimate parameters for the image. The image processing section 1B still further comprises an automatic set-up algorithm device 27 for calculating the histogram of the preliminary read-out image signals S.sub.P in the manner, which will be described later, and setting the parameters for the adjustments of the LUT 15, the LUT 19, the LUT 21, and the LUT 23 in accordance with the histogram. The LUT 12 is a transmittance-to-image density conversion table for converting the signals such that saturation may not be reached with respect to the image density range of the original image. The LUT 15 corrects the gray balance, the brightness, and the gradation. The LUT 15 comprises a gray balance adjustment table shown in FIG. 2A, a brightness correction table shown in FIG. 2B, and a .gamma. correction table shown in FIG. 2C, which are connected in series. The LUT 19 stores dynamic range compression tables having predetermined inclinations .alpha. shown in FIGS. 3A, 3B, 3C, 3D, and 3E. In this embodiment, .alpha. takes a negative value. As will be described later, the dynamic range compression tables are calculated in accordance with the preliminary read-out image signals S.sub.P. As illustrated in FIG. 4, the LUT 21 is a non-linear gradation conversion table and represents the relationship between the input signal and a processed image signal representing the reproduced image. The LUT 23 stores a linear gradation conversion table shown in FIG. 5. The inclination of the linear gradation conversion table is equal to 1+.alpha..

☐ 11. Document ID: US 5905817 A

L6: Entry 11 of 14 File: USPT May 18, 1999

DOCUMENT-IDENTIFIER: US 5905817 A
TITLE: Image reproducing method and apparatus using dynamic range compression based on an unsharp signal generated by IIR filter

Detailed Description Text (4):
The image processing section 1B comprises an amplifier 10 for amplifying the R, G, and B three color image signals, which have been detected by the CCD image sensor 8, and an analog-to-digital converter 11 for converting the amplified image signals into digital image signals. The image processing section 1B also comprises a look-up table (LUT) 12 for converting the digital image signals into image density signals, and frame memories 13R, 13G, and 13B, which respectively store the R, G, and B digital image signals having been converted into the image density signals. The image processing section 1B further comprises frame memories 14R, 14G, and 14B for respectively storing R, G, and B preliminary read-out image signals S.sub.P, which are obtained in cases where the preliminary read-out operation is carried out. The image processing section 1B still further comprises an LUT 15 for carrying out correction of gray balance, brightness, and gradation, which will be described later, on the digital image signals, and a matrix (MTX) 16 for correcting the image signals, which have been obtained from the processing carried out by the LUT 15, such that they may become the color signals capable of being reproduced in appropriate colors on a photosensitive material, which will be described later. The image processing section 1B also comprises an MTX 17 for converting the image signals, which have been corrected by the MTX 16, into a luminance, and a low-pass filter (LPF) 18 for forming an unsharp image signal from the luminance. The image processing section 1B further comprises an LUT 19 for compressing the dynamic range of the unsharp image signal and thereby obtaining an unsharp image signal for the adjustment of the low frequency contrast, and an addition means 20 for adding the original image signals and the unsharp image signal, which has been obtained from the dynamic range compressing process, to each other and thereby obtaining addition signals Sadd. The image processing section 1B still further comprises an LUT 21 for correcting the contrast (i.e., the low frequency contrast and the high frequency contrast) of the addition signals Sadd, i.e. for carrying out a gradation processing, and a digital-to-analog converter 22 for converting the signals, which have been obtained from the contrast correction, into analog signals. The image processing section 1B also comprises an LUT 23 for correcting the gradation of the preliminary read-out image signals S.sub.P, and a digital-to-analog converter 24 for converting the preliminary read-out image signals S.sub.P, which have been obtained from the gradation correction carried out by the LUT 23, into analog signals. The image processing section 1B further comprises a CRT display device 25 for reproducing a visible image from the preliminary read-out image signals S.sub.P obtained from the digital-to-analog conversion, and a mouse device 26 for operating the visible image, which is displayed on the CRT display device 25, in order to set ultimate parameters for the image. The image processing section 1B still further comprises an automatic set-up algorithm means 27 for calculating the histogram of the preliminary read-out image signals S.sub.P in the manner, which will be described later, and setting the parameters for the adjustments of the LUT 15, the LUT 19, the LUT 21, and the LUT 23 in accordance with the histogram.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

☐ 12. Document ID: US 5487116 A

L6: Entry 12 of 14 File: USPT Jan 23, 1996

DOCUMENT-IDENTIFIER: US 5487116 A
**** See image for Certificate of Correction ****
TITLE: Vehicle recognition apparatus

Detailed Description Text (9):
First, at step 3100 of FIG. 5, a differential processing is applied to road images picked up at step 2000 of FIG. 3 to extract edges. A 3.times.3 sobel filter is used to extract edges, and differential intensities obtained for each pixel are stored in the image memories 3a and 3b. FIG. 6 shows the results obtained by making two values the differential intensity E (x, y) by the use of the threshold Eth. The threshold Eth varies with the dynamic range and the like of the video camera 1b, and a range in which nine 8-bit gradation values are added or subtracted is within a range from 0 to 1530, so that it is preferable that the threshold Eth is set within a range from 80 to 120. Points shown with black in FIG. 6 are pixels having a differential intensity exceeding the threshold Eth, which pixels will be called edge pixels hereinafter.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 13. Document ID: JP 2000316090 A
L6: Entry 13 of 14   File: JPAB   Nov 14, 2000

DOCUMENT-IDENTIFIER: JP 2000316090 A
TITLE: PICTURE PROCESSOR, PICTURE PROCESSING SYSTEM PICTURE PROCESSING METHOD AND STORAGE MEDIUM

Abstract Text (2):
SOLUTION: The gradation conversion circuit 201 of a dynamic range compression processing(DRC processing) circuit 112a converts the gradation of the concentration of an original picture. A smoothing circuit 202 smoothes a picture after a processing in the gradation conversion circuit 201. A high frequency component generation circuit 203 subtracts the smoothed picture obtained in the smoothing circuit 202 from the picture after the processing in the gradation conversion circuit 201 and obtains the high frequency component of the picture. A conversion circuit 204 converts the amplitude of the high frequency component obtained in the high frequency component generation circuit 203. A high frequency component addition circuit 205 adds the high frequency component after conversion by the conversion circuit 204 to the processed picture in the gradation conversion circuit 201. In such a case, the amplitude of the added high frequency component is converted based on the magnitude of the high frequency component in the conversion circuit 204.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 14. Document ID: JP 2000316090 A
L6: Entry 14 of 14   File: DWPI   Nov 14, 2000

DERWENT-ACC-NO: 2001-055765
DERWENT-WEEK: 200107

TITLE: Image processor for X-ray image processing, has converter that converts size frequency component amplitude added to image, based on size of high frequency

component

Basic Abstract Text (1):
NOVELTY - The processor (112a) performs dynamic-range compression process to arbitrary images, by adding high frequency component obtained based on the image. A converter converts size of amplitude of high frequency component added to the image, after performing gradation conversion by gradation converter (201) based on size of high frequency component.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 1. Document ID: US 6480300 B1

L2: Entry 1 of 11 File: USPT Nov 12, 2002

DOCUMENT-IDENTIFIER: US 6480300 B1
TITLE: Image processing apparatus, image processing method and recording medium on which software for executing the image processing is recorded

Detailed Description Text (38):
The image processing subsection 54 subjects the image data, which has been captured by the scanner 12 under the image processing conditions set by the condition setting section 48 to be described later and stored in the fine scan memory 42, to various kinds of image processing. The various kinds of the image processing includes color balance adjustment, gradation adjustment, color adjustment, density adjustment, saturation adjustment, electronic magnification, frequency processing such as sharpness enhancement (edge enhancement for sharpening the edge), dodging (compressing/extending the density's dynamic range), creation of a soft-focused image, gain adjustment by executed by frequency bands, determination of an image density, and the like by means of a LUT, a MTX operation unit, a lowpass filter, an adder/subtracter, and the like. As a result, the image data can be reproduced on a color paper as a color image or a color soft-focused image, which is the object of the present invention, each having a desired density, gradation and tone. The details of the above image processing steps will be described later.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 2. Document ID: US 6101273 A

L2: Entry 2 of 11 File: USPT Aug 8, 2000

DOCUMENT-IDENTIFIER: US 6101273 A
TITLE: Image reproducing method and apparatus

Detailed Description Text (4):
The image processing section 1B comprises an amplifier 10 for amplifying the R, G, and B three color image signals, which have been detected by the CCD image sensor 8, and an analog-to-digital converter 11 for converting the amplified image signals into digital image signals. The image processing section 1B also comprises a look-up table (LUT) 12 for converting the digital image signals into image density signals, and frame memories 13R, 13G, and 13B, which respectively store the R, G, and B digital image signals having been converted into the image density signals. The image processing section 1B further comprises frame memories 14R, 14G, and 14B for respectively storing R, G, and B preliminary read-out image signals S.sub.P, which are obtained in cases where the preliminary read-out operation is carried out. The image processing section 1B still further comprises an LUT 15 for carrying out correction of gray balance, brightness, and gradation, which will be described later, on the digital image signals, and a matrix (MTX) 16 for correcting the image signals, which have been obtained from the processing carried out by the LUT 15, such that they may become the color signals capable of being reproduced in appropriate colors on a photosensitive material, which will be described later. The

image processing section 1B also comprises an MTX 17 for converting the image signals, which have been corrected by the MTX 16, into a luminance, and a low-pass filter (LPF) 18 for forming an unsharp signal from the luminance. The image processing section 1B further comprises an LUT 19 for compressing the dynamic range of the unsharp signal and thereby obtaining an unsharp image signal for the adjustment of the large area contrast, and an adder 20 for adding the original image signals and the unsharp image signal, which has been obtained from the dynamic range compressing process, to each other and thereby obtaining addition signals Sadd. The image processing section 1B still further comprises an LUT 21 for correcting the contrast (i.e., the large area contrast and the high frequency contrast) of the addition signals Sadd, i.e. for carrying out a gradation processing, and a digital-to-analog converter 22 for converting the signals, which have been obtained from the contrast correction, into analog signals. The image processing section 1B also comprises an LUT 23 for correcting the gradation of the preliminary read-out image signals S.sub.P, and a digital-to-analog converter 24 for converting the preliminary read-out image signals S.sub.P, which have been obtained from the gradation correction carried out by the LUT 23, into analog signals. The image processing section 1B further comprises a CRT display device 25 for reproducing a visible image from the preliminary read-out image signals S.sub.P having been obtained from the digital-to-analog conversion, and a mouse device 26 for operating the visible image, which is displayed on the CRT display device 25, in order to set ultimate parameters for the image. The image processing section 1B still further comprises an automatic set-up algorithm device 27 for calculating the histogram of the preliminary read-out image signals S.sub.P in the manner, which will be described later, and setting the parameters for the adjustments of the LUT 15, the LUT 19, the LUT 21, and the LUT 23 in accordance with the histogram. The LUT 12 is a transmittance-to-image density conversion table for converting the signals such that saturation may not be reached with respect to the image density range of the original image. The LUT 15 corrects the gray balance, the brightness, and the gradation. The LUT 15 comprises a gray balance adjustment table shown in FIG. 2A, a brightness correction table shown in FIG. 2B, and a .gamma. correction table shown in FIG. 2C, which are connected in series. The LUT 19 stores dynamic range compression tables having predetermined inclinations .alpha. shown in FIGS. 3A, 3B, 3C, 3D, and 3E. In this embodiment, .alpha. takes a negative value. As will be described later, the dynamic range compression tables are calculated in accordance with the preliminary read-out image signals S.sub.P. As illustrated in FIG. 4, the LUT 21 is a non-linear gradation conversion table and represents the relationship between the input signal and a processed image signal representing the reproduced image. The LUT 23 stores a linear gradation conversion table shown in FIG. 5. The inclination of the linear gradation conversion table is equal to 1+.alpha..

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☑ 3. Document ID: US 5905817 A

L2: Entry 3 of 11 File: USPT May 18, 1999

DOCUMENT-IDENTIFIER: US 5905817 A
TITLE: Image reproducing method and apparatus using dynamic range compression based on an unsharp signal generated by IIR filter

Detailed Description Text (4):
The image processing section 1B comprises an amplifier 10 for amplifying the R, G, and B three color image signals, which have been detected by the CCD image sensor 8, and an analog-to-digital converter 11 for converting the amplified image signals into digital image signals. The image processing section 1B also comprises a look-up table (LUT) 12 for converting the digital image signals into image density signals, and frame memories 13R, 13G, and 13B, which respectively store the R, G, and B digital image signals having been converted into the image density signals. The image processing section 1B further comprises frame memories 14R, 14G, and 14B for

respectively storing R, G, and B preliminary read-out image signals S.sub.P, which are obtained in cases where the preliminary read-out operation is carried out. The image processing section 1B still further comprises an LUT 15 for carrying out correction of gray balance, brightness, and gradation, which will be described later, on the digital image signals, and a matrix (MTX) 16 for correcting the image signals, which have been obtained from the processing carried out by the LUT 15, such that they may become the color signals capable of being reproduced in appropriate colors on a photosensitive material, which will be described later. The image processing section 1B also comprises an MTX 17 for converting the image signals, which have been corrected by the MTX 16, into a luminance, and a low-pass filter (LPF) 18 for forming an unsharp image signal from the luminance. The image processing section 1B further comprises an LUT 19 for compressing the dynamic range of the unsharp image signal and thereby obtaining an unsharp image signal for the adjustment of the low frequency contrast, and an addition means 20 for adding the original image signals and the unsharp image signal, which has been obtained from the dynamic range compressing process, to each other and thereby obtaining addition signals Sadd. The image processing section 1B still further comprises an LUT 21 for correcting the contrast (i.e., the low frequency contrast and the high frequency contrast) of the addition signals Sadd, i.e. for carrying out a gradation processing, and a digital-to-analog converter 22 for converting the signals, which have been obtained from the contrast correction, into analog signals. The image processing section 1B also comprises an LUT 23 for correcting the gradation of the preliminary read-out image signals S.sub.P, and a digital-to-analog converter 24 for converting the preliminary read-out image signals S.sub.P, which have been obtained from the gradation correction carried out by the LUT 23, into analog signals. The image processing section 1B further comprises a CRT display device 25 for reproducing a visible image from the preliminary read-out image signals S.sub.P obtained from the digital-to-analog conversion, and a mouse device 26 for operating the visible image, which is displayed on the CRT display device 25, in order to set ultimate parameters for the image. The image processing section 1B still further comprises an automatic set-up algorithm means 27 for calculating the histogram of the preliminary read-out image signals S.sub.P in the manner, which will be described later, and setting the parameters for the adjustments of the LUT 15, the LUT 19, the LUT 21, and the LUT 23 in accordance with the histogram.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 4. Document ID: US 5774601 A

L2: Entry 4 of 11 File: USPT Jun 30, 1998

DOCUMENT-IDENTIFIER: US 5774601 A
TITLE: System and method for adaptive interpolation of image data

Brief Summary Text (11):
In addition, the response characteristics of different imaging media can greatly affect the visible results of the interpolation. It has been observed, for example, that dry silver film has a development speed that is significantly slower than that of conventional silver halide film, in both toe and shoulder speeds. This slower development speed can render interpolation functions previously considered effective for silver halide films less effective for dry silver film. The slower development speed requires that the scanning laser transmit a higher exposing energy to the imaging media to achieve a desired maximum optical density. The higher exposing energy translates to a larger dynamic range for the scanning laser in order to expose every gradation on the imaging media. However, the available dynamic range of existing, commercially available scanning lasers, such as laser diodes, may be limited for required exposing wavelengths in the infra-red regions. As a result, the scanning laser may be incapable of producing the desired number of gradations. The slower development speed of the dry silver film, given the limitations of the scanning laser, can result in loss of high spatial frequencies. The visible

manifestation of the loss of high spatial frequencies may be a loss of apparent edge sharpness producing an undesirable blurring in high contrast areas. The blurring is particularly apparent in those areas involving a transition from image data representing alphanumeric text at a minimum density to image data representing pictorial information at much higher densities approaching maximum density. Therefore, an interpolation function considered appropriate for silver halide film may produce inadequate results with a dry silver film.

Brief Summary Text (12):
As a further variation, presentation of the image data on alternate output media such as a cathode ray tube (CRT) display monitor, having a different response characteristic than film, can also affect the visible results of interpolation functions. A CRT monitor medium has several problems when compared to a print film for image presentation. For example, a CRT monitor suffers from severe dynamic range limitations (maximum intensity to minimum intensity range) relative to film. The dynamic range of a CRT monitor limits perceptible image gradation presentation to about 100-150 levels as compared to print films, which may provide 1500-2000 levels of gradation. Thus, like dry silver film, CRT monitors may suffer blurring in high contrast areas. It is noted, however, that the blurring suffered by a CRT monitor may be much more pronounced than that on dry silver film. In addition, a CRT monitor produces viewing glare and geometric distortion not present in films. Thus, the perception of fine edges and detail is much more difficult for CRT monitors than for print films. Due to the smaller number of gradation levels, and the glare and distortion in a CRT monitor, an interpolation function appropriate for a film may be inappropriate for a CRT monitor.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 5. Document ID: US 5487116 A

L2: Entry 5 of 11 File: USPT Jan 23, 1996

DOCUMENT-IDENTIFIER: US 5487116 A
**** See image for Certificate of Correction ****
TITLE: Vehicle recognition apparatus

Detailed Description Text (9):
First, at step 3100 of FIG. 5, a differential processing is applied to road images picked up at step 2000 of FIG. 3 to extract edges. A 3.times.3 sobel filter is used to extract edges, and differential intensities obtained for each pixel are stored in the image memories 3a and 3b. FIG. 6 shows the results obtained by making two values the differential intensity E (x, y) by the use of the threshold Eth. The threshold Eth varies with the dynamic range and the like of the video camera 1b, and a range in which nine 8-bit gradation values are added or subtracted is within a range from 0 to 1530, so that it is preferable that the threshold Eth is set within a range from 80 to 120. Points shown with black in FIG. 6 are pixels having a differential intensity exceeding the threshold Eth, which pixels will be called edge pixels hereinafter.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 6. Document ID: US 5140413 A

L2: Entry 6 of 11 File: USPT Aug 18, 1992

DOCUMENT-IDENTIFIER: US 5140413 A

**** See image for Certificate of Correction ****
TITLE: Image processing apparatus including processing means for moving image and performing conversion

Detailed Description Text (106):
The input VIDEO DATA 800 is latched by the latch circuit 900 at the time of rise of the VCLK 801 and is synchronized with clocks (see 800 and 801 in FIG. 26B). The VIDEO DATA 815 output from the latch is delivered to a LUT (Look-Up Table) 901 composed of a ROM or a RAM, where a gradation compensation is effected. The gradation-compensated signal is then converted into a single analog video signal through a D/A converter 902, and the thus formed analog signal is input to comparators 910 and 911 so as to be compared with a later-mentioned triangular weave. The comparators 910 and 911 receive, at their other inputs, signals 808 and 809 which are triangular waves synchronized with VCLK and formed independently. More specifically, one of these two triangular waves is a wave WV1 which is generated by a triangular wave generating circuit 908 in accordance with a triangular wave generation reference signal 806 obtained by demultiplying, by a J-K flip-flop 906 for example, into 1/2 a synchronizing clock 2VCLK 803 which has a frequency twice as high the frequency of the clock VCLK 801. The other triangular wave is a wave WV2 which is generated by another triangular wave generating circuit 909 in accordance with a signal 807 (see FIG. 26B) which is obtained by demultiplying the signal 2VCLK into 1/6 by a demultiplying or frequency dividing circuit 905 designed to output 1/6 of the input frequency. As will be seen from FIG. 26B, the triangular waves and the VIDEO DATA are all synchronous with the VCLK. In addition, a signal inverted from the horizontal synchronizing signal HSYNC is applied to the circuits 905 and 906 so as to initialize these circuit at the timing conforming with the signal HSYNC, thereby causing the triangular waves and the VIDEO DATA to be synchronized with the signal HSYNC which also is generated in synchronization with VCLK. As a result of this operation, signals of pulse widths variable in accordance with the value of the input VIDEO DATA 800 are obtained at the outputs 810 and 811 of the comparators 910 and 911, respectively. Thus, in this system, the laser lights up when the level of the output from the AND gate 913 shown in FIG. 26 is "1" so that dots are printed on the print paper. When the level of the output from the AND gate 913 is "0", the laser does not operate so that no dot is printed. It is therefore possible to control the turning off of the lamp by LON 805. FIG. 26C shows a change in the level of the video signal D from "black" to "white" in the rightward direction. White and black levels are input to the PWM circuit as FF and 00, respectively, so that the output of the D/A converter 902 is changed as shown by a curve D.sub.i in FIG. 26C. On the other hand, the triangular waves are as shown by WV1 and WV2 in (a) and (b) of FIG. 26C. Therefore, the pulse widths of the outputs from the comparators CMP1 and CMP2 are progressively narrowed as the video signal level is shifted from "black" towards "white", as will be seen from curves PW1 and PW2. When the PW1 is selected, the pitch of the dots on the print paper is progressively changed as P.sub.1 to P.sub.2, P.sub.2 to P.sub.3 and P.sub.43 to P.sub.4. Thus, the variance of the pulse width has a dynamic range represented by W1. On the other hand, when PW2 is selected, the dot pitch is changed from P.sub.5 to P.sub.6. In this case, the dynamic range of the pulse width is W2 which is about three times as large as PW1. For instance, the printing density (resolution) is set to be about 400 lines/inch when PW1 is selected and about 133 lines/inch when PW2 is selected. From this fact, it will be understood that the resolution obtained when PW1 is selected is about 3 times as high as that obtained when PW2 is selected. On the other hand, when PW2 is selected, a remarkable improvement in the gradation is attained because the dynamic range of the pulse width in this case is about three times as wide as that obtained when PW1 is selected. Therefore, a signal SCRSEL 804 is supplied from an external circuit so as to select PW1 when a high resolutions required and to select PW2 when high degree of gradation is desired. In FIG. 26A, numeral 912 denotes a selector which selects the input A when the level of the signal SCRSEL 804 is "0" thereby selecting PW1 and, when the level of this signal is "1" selects PW2. PW1 or PW2 thus selected is output from the output terminal O and the laser is activated for a period corresponding to the finally obtained pulse width, thereby printing dots.

☐ 7. Document ID: US 4969053 A

L2: Entry 7 of 11 File: USPT Nov 6, 1990

DOCUMENT-IDENTIFIER: US 4969053 A

**** See image for Certificate of Correction ****

TITLE: A color film reading apparatus providing high-gradation color signals

Detailed Description Text (61):

A digital input signal VIDEO DATA 800 is latched by a latch circuit 900 at the timing of a leading edge of a clock VCLK 801, and is thereby synchronized with the clock. (Refer to waveforms 800 and 801 of FIG. 26B.) A signal VIDEO DATA 815 output from the latch circuit 900 is subjected to gradation correction in a look-up table (LUT) 901 constituted by ROMs or RAMs. The signal is then subjected to D/A conversion in a D/A (digital/analog) converter 902 to form one analog video signal. The thus-generated analog video signal is input to the next-stage comparators 910 and 911, and is compared with triangle waves which will be described later. Signals 808 and 809, which are respectively supplied to the other inputs of the comparators 910 and 911, are triangle waves which are independently generated in synchronization with the clock VCLK. More specifically, a J-K flip-flop 906 performs 1/2 demultiplication of a synchronizing clock 2VCLK 803 with a frequency of twice of that of a clock VCLK to output a reference signal 806, and a triangle wave generation circuit 908 generates a triangle wave WV1 in accordance with the reference signal 806. Another 1/6 J-K flip-flop 905 performs 1/6 demultiplication of the clock 2VCLK 803 to output a reference signal 807, and a triangle wave generation circuit 909 generates a triangle wave WV2 in accordance with the reference signal 807. The thus-obtained wave signals and the signal VIDEO DATA are generated in synchronization with the clock VCLK as shown in FIG. 26B. In addition, a signal HSYNC, which is generated in synchronization with the clock VCLK and which is inverted so as to be synchronized at a signal line HSYNC 802, initializes the respective signals of the circuits 905 and 906 at the timing of the signal HSYNC. Through the above-described operation, signals having the pulse widths shown in FIG. 26C are provided at respective outputs 810 and 811 of the comparators CMP1 910 and CMP2 911. In the present system, when an AND gate 913 shown in FIG. 26A outputs "1", a laser is put on to print dots on a print paper. When the AND gate 913 outputs "0", the laser is put off and nothing is printed on the print paper. The AND gate 913 is controlled by a control signal LON 805. FIG. 26C illustrates a case where the level of an image signal D varies from left to right, i.e., "black" to "white". Since "white" and "black" are respectively input as "FF" and "00" to the PWM circuit, the output of the D/A converter 902 varies as shown by line Di. The triangle wave WV1 and the triangle wave WV2 vary as shown in Parts (a) and (b) of FIG. 26C, respectively. Therefore, the pulse widths of outputs PW1 and PW2 of the comparators CMP1 and CMP2 become narrow as the level of the image signal D varies from "black" to "white". Also, as can be seen from FIG. 26C, if the output PW1 is selected, dots are printed on the print paper at intervals of P.sub.1 .fwdarw. P.sub.2 .fwdarw. P.sub.3 .fwdarw. P.sub.4, and the variation of the pulse width has a dynamic range W1. On the other hand, if the output PW2 is selected, dots are printed at intervals of P.sub.5 .fwdarw. P.sub.6, and the pulse width has a dynamic range W2. The dynamic range and the intervals of the output PW2 is three times those of the output PW1. For example, when PW1 is selected, print density (the degree of resolution) is set to about 400 lines/inch and, when PW2 is selected, the print density is set to about 133 lines/inch. As can be seen from the foregoing, if PW1 is selected, the degree of resolution becomes about three times as high as that in the case of PW2. On the other hand, if PW2 is selected, the dynamic range of the pulse width is about three times as wide as that in the case of PW1, whereby the quality of gradation is significantly improved. Accordingly, an external circuit outputs a selection signal SCRSEL 804 to a selector 912 so that PW1 and PW2 are selected, depending upon whether a high degree of resolution or a high degree of gradation is desired. When the signal SCRSEL 804 is "0", a selector 912 in FIG. 26A selects an input A and outputs the signal PW1 through an output terminal 0 while, when the SCRSEL 804 is "1", the selector 912 selects an input B and outputs the signal PW2 through the output terminal 0. The laser is put on during the resultant pulse width to print

dots.

☐ 8. Document ID: US 4922335 A

L2: Entry 8 of 11 File: USPT May 1, 1990

DOCUMENT-IDENTIFIER: US 4922335 A
**** See image for Certificate of Correction ****
TITLE: Color film reading apparatus providing high-gradation color signals

Detailed Description Text (61):
A digital input signal VIDEO DATA 800 is latched by a latch circuit 900 at the timing of a leading edge of a clock VCLK 801, and is thereby synchronized with the clock. (Refer to waveforms 800 and 801 of FIG. 26B.) A signal VIDEO DATA 815 output from the latch circuit 900 is subjected to gradation correction in a look-up table (LUT) 901 constituted by ROMs or RAMs. The signal is then subjected to D/A conversion in a D/A (digital/analog) converter 902 to form one analog video signal. The thus-generated analog video signal is input to the next-stage comparators 910 and 911, and is compared with triangle waves which will be described later. Signals 808 and 809, which are respectively supplied to the other inputs of the comparators 910 and 911, are triangle waves which are independently generated in synchronization with the clock VCLK. More specifically, a J-K flip-flop 906 performs 1/2 demultiplication of a synchronizing clock 2VCLK 803 with a frequency of twice of that of a clock VCLK to output a reference signal 806, and a triangle wave generation circuit 908 generates a triangle wave WV.sub.1 in accordance with the reference signal 806. Another 1/6 J-K flip-flop 905 performs 1/6 demultiplication of the clock 2VCLK 803 to output a reference signal 807, and a triangle wave generation circuit 909 generates a triangle wave WV.sub.2 in accordance with the reference signal 807. The thus-obtained wave signals and the signal VIDEO DATA are generated in synchronization with the clock VCLK as shown in FIG. 26B. In addition, a signal HSYNC, which is generated in synchronization with the clock VCLK and which is inverted so as to be synchronized at a signal line HSYNC 802, initializes the respective signals of the circuits 905 and 906 at the timing of the signal HSYNC. Through the above-described operation, signals having the pulse widths shown in FIG. 26C are provided at respective outputs 810 and 811 of the comparators CMP1 910 and CMP2 911. In the present system, when an AND gate 913 shown in FIG. 26A outputs "1", a laser is put on to print dots on a print paper. When the AND gate 913 outputs "0", the laser is put off and nothing is printed on the print paper. The AND gate 913 is controlled by a control signal LON 805. FIG. 26C illustrates a case where the level of an image signal D varies from left to right, i.e., "black" to "white". Since "white" and "black" are respectively input as "FF" and "OO" to the PWM circuit, the output of the D/A converter 902 varies as shown by line Di. The triangle wave WV.sub.1 and the triangle wave WV.sub.2 vary as shown in Parts (a) and (b) of FIG. 26C, respectively. Therefore, the pulse widths of outputs PW1 and PW2 of the comparators CMP1 and CMP2 become narrow as the level of the image signal D varies from "black" to "white". Also, as can be seen from FIG. 26C, if the output PW1 is selected, dots are printed on the print paper at intervals of P.sub.1 .fwdarw.P.sub.2 .fwdarw.P.sub.3 .fwdarw.P.sub.4, and the variation of the pulse width has a dynamic range W1. On the other hand, if the output PW2 is selected, dots are printed at intervals of P.sub.5 .fwdarw.P.sub.6, and the pulse width has a dynamic range W2. The dynamic range and the intervals of the output PW2 is three times those of the output PW1. For example, when PW1 is selected, print density (the degree of resolution) is set to about 400 lines/inch and, when PW2 is selected, the print density is set to about 133 lines/inch. As can be seen from the foregoing, if PW1 is selected, the degree of resolution becomes about three times as high as that in the case of PW2. On the other hand, if PW2 is selected, the dynamic range of the pulse width is about three times as wide as that in the case of PW1, whereby the quality of gradation is significantly improved. Accordingly, an external circuit

outputs a selection signal SCRSEL 804 to a selector 912 so that PW1 and PW2 are selected, depending upon whether a high degree of resolution or a high degree of gradation is desired. When the signal SCRSEL 804 is "0", a selector 912 in FIG. 26A selects an input A and outputs the signal PW1 through an output terminal O while, when the SCRSEL 804 is "1", the selector 912 selects an input B and outputs the signal PW2 through the output terminal O. The laser is put on during the resultant pulse width to print dots.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 9. Document ID: US 4873570 A

L2: Entry 9 of 11 File: USPT Oct 10, 1989

DOCUMENT-IDENTIFIER: US 4873570 A
**** See image for Certificate of Correction ****
TITLE: Color image processing apparatus for selectively altering image colors

Detailed Description Text (105):
The input VIDEO DATA 800 is latched by the latch circuit 900 at the time of rise of the VCLK 801 and is synchronized with clocks (see 800 and 801 in FIG. 26B). The VIDEO DATA 815 output from the latch is delivered to a LUT (Look-Up Table) 901 composed of a ROM or a RAM, where a gradation compensation is effected. The gradation-compensated signal is then converted into a single analog video signal through a D/A converter 902, and the thus formed analog signal is input to comparators 910 and 911 so as to be compared with a later-mentioned triangular weave. The comparators 910 and 911 receive, at their other inputs, signals 808 and 809 which are triangular waves synchronized with VCLK and formed independently. More specifically, one of these two triangular waves is a wave WV1 which is generated by a triangular wave generating circuit 908 in accordance with a triangular wave generation reference signal 806 obtained by demultiplying, by a J-K flip-flop 906 for example into 1/2 a synchronizing clock 2VCLK 803 which has a frequency twice as high the frequency of the clock VCLK 801. The other triangular wave is a wave WV2 which is generated by another triangular wave generating circuit 909 in accordance with a signal 807 (see FIG. 26B) which is obtained by demultiplying the signal 2VCLK into 1/6 by a demultiplying or frequency dividing circuit 905 designed to output 1/6 of the input frequency. As will be seen from FIG. 26B, the triangular waves and the VIDEO DATA are all synchronous with the VCLK. In addition, a signal inverted from the horizontal synchronizing signal HSYNC is applied to the circuits 905 and 906 so as to initialize these circuit at the timing conforming with the signal HSYNC, thereby causing the triangular waves and the VIDEO DATA to be synchronized with the signal HSYNC which also is generated in synchronization with VCLK. As a result of this operation, signals of pulse widths variable in accordance with the value of the input VIDEO DATA 800 are obtained at the outputs 810 and 811 of the comparators 910 and 911, respectively. Thus, in this system, the laser lights up when the level of the output from the AND gate 913 shown in FIG. 26 is "1" so that dots are printed on the print paper. When the level of the output from the AND gate 913 is "0", the laser does not operate so that no dot is printed. It is therefore possible to control the turning off of the lamp by LON 805. FIG. 26C shows a change in the level of the video signal D from "black" to "white" in the rightward direction. White and black levels are input to the PWM circuit as FF and 00, respectively, so that the output of the D/A converter 902 is changed as shown by a curve Di in FIG. 26C. On the other hand, the triangular waves are as shown by WV1 and WV2 in (a) and (b) of FIG. 26C. Therefore, the pulse widths of the outputs from the comparators CMP1 and CMP2 are progressively narrowed as the video signal level is shifted from "black" towards "white", as will be seen from curves PW1 and PW2. When the PW1 is selected, the pitch of the dots on the print paper is progressively changed as P.sub.1 to P.sub.2, P.sub.2 to P.sub.3 and P.sub.43 to P.sub.4. Thus, the variance of the pulse width has a dynamic range represented by W1. On the other hand, when PW2 is selected, the dot pitch is changed from P.sub.5 to P.sub.6. In this case, the

dynamic range of the pulse width is W2 which is about three times as large as PW1. For instance, the printing density)resolution) is set to be about 400 lines/inch when PW1 is selected and about 133 lines/inch when PW2 is selected. From this fact, it will be understood that the resolution obtained when PW1 is selected is about 3 times as high as that obtained when PW2 is selected. On the other hand, when PW2 is selected, a remarkable improvement in the gradation is attained because the dynamic range of the pulse width in this case is about three times as wide as that obtained when PW1 is selected. Therefore, a signal SCRSEL 804 is supplied from an external circuit so as to select PW1 when a high resolutions required and to select PW2 when high degree of gradation is desired. In FIG. 26A, numeral 912 denotes a selector which selects the input A when the level of the signal SCRSEL 804 is "0" thereby selecting PW1 and when the level of this signal is "1" selects PW2. PW1 or PW2 thus selected is output from the output terminal 0 and the laser is activated for a period corresponding to the finally obtained pulse width, thereby printing dots.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 10. Document ID: JP 2000316090 A

L2: Entry 10 of 11 File: JPAB Nov 14, 2000

DOCUMENT-IDENTIFIER: JP 2000316090 A
TITLE: PICTURE PROCESSOR, PICTURE PROCESSING SYSTEM PICTURE PROCESSING METHOD AND STORAGE MEDIUM

Abstract Text (2):
SOLUTION: The gradation conversion circuit 201 of a dynamic range compression processing(DRC processing) circuit 112a converts the gradation of the concentration of an original picture. A smoothing circuit 202 smoothes a picture after a processing in the gradation conversion circuit 201. A high frequency component generation circuit 203 subtracts the smoothed picture obtained in the smoothing circuit 202 from the picture after the processing in the gradation conversion circuit 201 and obtains the high frequency component of the picture. A conversion circuit 204 converts the amplitude of the high frequency component obtained in the high frequency component generation circuit 203. A high frequency component addition circuit 205 adds the high frequency component after conversion by the conversion circuit 204 to the processed picture in the gradation conversion circuit 201. In such a case, the amplitude of the added high frequency component is converted based on the magnitude of the high frequency component in the conversion circuit 204.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 11. Document ID: JP 2000316090 A

L2: Entry 11 of 11 File: DWPI Nov 14, 2000

DERWENT-ACC-NO: 2001-055765
DERWENT-WEEK: 200107

TITLE: Image processor for X-ray image processing, has converter that converts size frequency component amplitude added to image, based on size of high frequency component

Basic Abstract Text (1):
NOVELTY - The processor (112a) performs dynamic-range compression process to

arbitrary images, by adding high frequency component obtained based on the image. A converter converts size of amplitude of high frequency component added to the image, after performing gradation conversion by gradation converter (201) based on size of high frequency component.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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Term	Documents
DYNAMIC.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	373891
DYNAMICS.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	44963
HIGH.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	5301879
HIGHS.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	1966
EDGE.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	1712718
EDGES.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	949873
GRADATION$5	0
GRADATION.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	45837
GRADATIONAL.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	1223
GRADATIONALITY.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	1
GRADATIONALLY.DWPI,TDBD,EPAB,JPAB,USPT,PGPB.	168
(GRADATION$5 SAME (DYNAMIC ADJ1 RANG$3) SAME ((HIGH ADJ1 FREQUEN$3) OR EDGE) SAME (ADD$5 OR SUM$5)).USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	11

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1. Document ID: US 20020034336 A1

L2: Entry 1 of 22 File: PGPB Mar 21, 2002

DOCUMENT-IDENTIFIER: US 20020034336 A1
TITLE: IMAGE PROCESSING METHOD AND APPARATUS

Current US Classification, US Primary Class/Subclass (1):
382/274

Current US Classification, US Secondary Class/Subclass (1):
358/447

Current US Classification, US Secondary Class/Subclass (2):
382/254

Detail Description Paragraph (94):
[0168] The setup section 44 has a function set thereto which determines the rate of dynamic range compression .alpha. of the entire area of the unsharp image created by the LPF 58 (76) from the dynamic range of read-out image information. The setup section 44 determines the compression rate of dynamic range .alpha. of the prescanned image information using the function.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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2. Document ID: US 20010055122 A1

L2: Entry 2 of 22 File: PGPB Dec 27, 2001

DOCUMENT-IDENTIFIER: US 20010055122 A1
TITLE: Adaptive autobackground suppression to compensate for integrating cavity effect

Current US Classification, US Primary Class/Subclass (1):
358/1.9

Current US Classification, US Secondary Class/Subclass (1):
382/169

Current US Classification, US Secondary Class/Subclass (2):
382/172

Current US Classification, US Secondary Class/Subclass (3):
382/274

Current US Classification, US Secondary Class/Subclass (4):
382/275

Detail Description Paragraph (87):
[0106] In step S170, the background grey-level value is determined using the gain G.

This value is used to determine the adjusted dynamic range of an image of the input document.

Detail Description Paragraph (89):
[0108] FIG. 13 shows a block diagram of a document background determining and dynamic range adjusting system 100 used to implement the preferred methods of this invention. The scanner 300 scans the input document. The histogram generator 120 generates a 256 grey-level histogram The histogram compressor 130 compresses the histogram into a 64 grey-level histogram The histogram peak determining circuit 140 determines the peak frequency values of the compressed histogram. The mean grey-level determining circuit 150 calculates the mean grey-level value of the compressed histogram. The standard deviation determining circuit 160 calculates the standard deviation of the compressed histogram. The background white determining circuit 170 calculates the "background white" of the input document. The gain determining circuit 180 calculates the gain of the input document. The background grey-level determining circuit 190 determines the background grey-level value of the input document. The dynamic range determining circuit 200 determines the dynamic range of an image of the input document. The output grey-level determining circuit 210 determines the output grey-level values of the output image of the input document. The memory 220 stores the output image of the input document. The controller 110 sends control signals to the various circuits 120-210 through a control bus 230. Data flows between the various circuits 120-210, the controller 110 and the memory 220 through a data bus 240. A printer 400 inputs the image of the input document and generates a hard copy of the image. The scanner 300 and the printer 400 are connected to the document background determining and dynamic range adjusting system 100 through the data bus 240.

Detail Description Paragraph (90):
[0109] As shown in FIG. 13, the system 100 is preferably implemented on a programmed general purpose computer. However, the system 100 can also be implemented on a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an ASIC or other integrated circuit, a hardwired electronic or logic device such as a discrete element circuit, a programmable logic device such as a PLD, PLA, FPGA, or the like. In general, any device on which a finite state machine capable of implementing the flowcharts shown in FIGS. 12A and 12B can be used to implement the document background determining and dynamic range adjusting system 100.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 3. Document ID: US 6366367 B1

L2: Entry 3 of 22 File: USPT Apr 2, 2002

DOCUMENT-IDENTIFIER: US 6366367 B1
TITLE: Method and device for the digital detection of transparent and opaque documents

Abstract Text (1):
The invention relates to a method and device used for the digital detection of transparent and opaque documents, comprising a CCD pick-up element, a document holder, an illuminating device and elements for covering the edges (masking unit) of the documents. The method comprises the following steps: a) placing the document on the document holder; b) determining the size of the document; c) automatically adjusting a zoom objective, assigned to the scanner, in relation to the document; d) automatically adjusting the masking to the document size; e) beginning the exposure process; f) automatically adjusting the illumination by determining the dynamic range of the image intensity; g) exposing the CCD chip in the camera (one shot); h) memorizing the digitized data in a PC memory; i) further processing the memorized data in the PC or in an external data processing installation.

Brief Summary Text (15):
(f) Automatic adjustment of the illumination by determining the dynamic range of the image intensity.

Current US Original Classification (1):
358/487

Current US Cross Reference Classification (1):
358/474

Current US Cross Reference Classification (2):
358/506

CLAIMS:

13. A method for the digital detection of both transparent and opaque documents with a CCD-recording element equipped with a zoom lens; a document holder; an illuminating device; a masking unit comprising elements for covering the edges of the documents; and an element for determining the size of the document, which comprises the following steps:

a) placing the document on the document holder;

b) determining the size of the document by means of the CCD-recording element, the CCD-recording element operating in a still-video function wherein a plurality of images of reduced resolution are recorded per second;

c) automatically adjusting the zoom lens associated with the CCD-recording element to the document;

d) using the still-video function to automatically adjust the masking by the masking unit to the size of the document;

e) starting the exposure process and using the still-video function to determine the dynamic range of the image intensity to control the illumination of the exposure process;

f) exposing the CCD-chip of the recording element to generate digitized data of an individual image;

g) reading the digital data into the memory of a PC that controls via software both the recording element and the illumination device, as well as the drive of the masking unit and the motor of the zoom lens; and

h) further processing the stored data in the PC or in external data processing equipment.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw Desc | Image

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☐ 4. Document ID: US 6198845 B1

L2: Entry 4 of 22 File: USPT Mar 6, 2001

DOCUMENT-IDENTIFIER: US 6198845 B1
TITLE: Method for determining document background for adjusting the dynamic range of an image of the document

Detailed Description Text (70):
In step S170, the background grey-level value is determined using the gain G. This

value is used to determine the adjusted dynamic range of an image of the input document.

Detailed Description Text (72):
FIG. 13 shows a block diagram of a document background determining and dynamic range adjusting system 100 used to implement the preferred methods of this invention. The scanner 300 scans the input document. The histogram generator 120 generates a 256 grey-level histogram. The histogram compressor 130 compresses the histogram into a 64 grey-level histogram. The histogram peak determining circuit 140 determines the peak frequency values of the compressed histogram. The mean grey-level determining circuit 150 calculates the mean grey-level value of the compressed histogram. The standard deviation determining circuit 160 calculates the standard deviation of the compressed histogram. The background white determining circuit 170 calculates the "background white" of the input document. The gain determining circuit 180 calculates the gain of the input document. The background grey-level determining circuit 190 determines the background grey-level value of the input document. The dynamic range determining circuit 200 determines the dynamic range of an image of the input document. The output grey-level determining circuit 210 determines the output grey-level values of the output image of the input document. The memory 220 stores the output image of the input document. The controller 110 sends control signals to the various circuits 120-210 through a control bus 230. Data flows between the various circuits 120-210, the controller 110 and the memory 220 through a data bus 240. A printer 400 inputs the image of the input document and generates a hard copy of the image. The scanner 300 and the printer 400 are connected to the document background determining and dynamic range adjusting system 100 through the data bus 240.

Detailed Description Text (73):
As shown in FIG. 13, the system 100 is preferably implemented on a programmed general purpose computer. However, the system 100 can also be implemented on a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an ASIC or other integrated circuit, a hardwired electronic or logic device such as a discrete element circuit, a programmable logic device such as a PLD, PLA, FPGA, or the like. In general, any device on which a finite state machine capable of implementing the flowcharts shown in FIGS. 12A and 12B can be used to implement the document background determining and dynamic range adjusting system 100.

Current US Original Classification (1):
382/169

Current US Cross Reference Classification (2):
358/3.01

Current US Cross Reference Classification (3):
358/3.21

Current US Cross Reference Classification (4):
358/3.26

Current US Cross Reference Classification (5):
382/167

Current US Cross Reference Classification (6):
382/260

Current US Cross Reference Classification (7):
382/274

Current US Cross Reference Classification (8):
382/275

CLAIMS:

19. The method for adjusting the dynamic range of an image according to claim 17,

wherein determining the curve comprises:

determining a peak frequency value for the histogram;

identifying a plurality of grey-level values adjacent to the grey-level value having the peak frequency value;

identifying frequency values of the plurality of adjacent grey-level values; and

determining the curve which passes through the peak frequency value and the frequency values of the plurality of adjacent grey-level values.

25. The method for adjusting the dynamic range of an image according to claim 23, wherein determining the distribution curve comprises:

determining a peak frequency value for the compressed histogram;

identifying a plurality of grey-level values adjacent to the grey-level value having the peak frequency value;

identifying frequency values of the plurality of adjacent grey-level values; and

determining the distribution curve which passes through the peak frequency value and the frequency values of the plurality of adjacent grey-level values.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 5. Document ID: US 6195170 B1

L2: Entry 5 of 22 File: USPT Feb 27, 2001

DOCUMENT-IDENTIFIER: US 6195170 B1
TITLE: Facsimile apparatus that detects print failure to retain data in memory

Detailed Description Text (35):
For the determination regarding print failures as described above, this embodiment sets the base color portion 74 of a recording sheet to the detecting position 54, and adjusts the amount of light emission from the LED 52 to establish (sheet base color)=(white level) by performing pulse width modulation on the LED 52, and sets the duty ratio Dpwm that establishes (sheet base color)=(white level), as a control value Don, and determines an operating black level Vblack based on the detection voltage occurring when the LED 52 is off (steps S41 through S49). Then, the multi-function apparatus 1 of the embodiment determines an actual dynamic range (Vblack-Vwhite) taking into account the base color of a recording sheet and the conditions during operation. Based on the actual dynamic range, the multi-function apparatus 1 determines a threshold value for determination as to whether there is a print failure. Therefore, even if the recording sheet being used is a recycled paper sheet that is gray or brownish in color, the multi-function apparatus 1 is able to reliably determine whether there is a print failure. Furthermore, if there is external light coming into the detecting position, the multi-function apparatus 1 can overcome the effect of such external light and make a reliable determination regarding print failures.

Current US Original Classification (1):
358/1.14

Current US Cross Reference Classification (1):
358/1.16

Current US Cross Reference Classification (2):
358/1.9

Current US Cross Reference Classification (3):
358/296

Current US Cross Reference Classification (4):
358/401

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 6. Document ID: US 6101273 A

L2: Entry 6 of 22 File: USPT Aug 8, 2000

DOCUMENT-IDENTIFIER: US 6101273 A
TITLE: Image reproducing method and apparatus

Detailed Description Text (19):
Also, as illustrated in FIG. 3B, a function f.sub.l (.alpha..sub.l) representing the dynamic range compression table for the portion, in which the image signal value is large, i.e. the bright portion, is set. Further, as illustrated in FIG. 3C, a function f.sub.d (.alpha..sub.d) representing the dynamic range compression table for the portion, in which the image signal value is small, i.e. the dark portion, is set. These functions are determined respectively by the rates of dynamic range compression .alpha..sub.l and .alpha..sub.d, which have been set in the manner described above.

Current US Original Classification (1):
382/169

Current US Cross Reference Classification (1):
358/461

Current US Cross Reference Classification (2):
382/167

Current US Cross Reference Classification (3):
382/274

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 7. Document ID: US 6058202 A

L2: Entry 7 of 22 File: USPT May 2, 2000

DOCUMENT-IDENTIFIER: US 6058202 A
TITLE: Method of determining exposure condition of photograph

Current US Original Classification (1):
382/112

Current US Cross Reference Classification (3):
382/168

CLAIMS:

4. A method of determining an exposure condition of a photographic material, comprising:

obtaining a density of a particular point of an image represented by an image signal generated based on the photographic material;

determining a dynamic range of the image signal; and

determining underexposure and overexposure of the photographic material based on both the density of the particular point and the dynamic range of the image signal,

wherein determining whether the photographic material is underexposed or overexposed comprises:

determining a probability of malexposure based on the dynamic range of the image signal; and

determining whether the photographic material is underexposed or overexposed based on the probability of malexposure, and

wherein the probability of malexposure is determined by applying the dynamic range to a random function, where the random function is defined such that the second probability has a small value when the dynamic range is smaller than a predetermined value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 8. Document ID: US 5905817 A

L2: Entry 8 of 22 File: USPT May 18, 1999

DOCUMENT-IDENTIFIER: US 5905817 A
TITLE: Image reproducing method and apparatus using dynamic range compression based on an unsharp signal generated by IIR filter

Detailed Description Text (23):
Also, as illustrated in FIG. 3B, a function f.sub.1 (.alpha..sub.1) representing the dynamic range compression table for the portion, in which the image signal value is large, i.e. the bright portion, is set. Further, as illustrated in FIG. 3C, a function f.sub.d (.alpha..sub.d) representing the dynamic range compression table for the portion, in which the image signal value is small, i.e. the dark portion, is set. These functions are determined respectively by the rates of dynamic range compression .alpha..sub.1 and .alpha..sub.d, which have been set in the manner described above.

Current US Original Classification (1):
382/260

Current US Cross Reference Classification (1):
358/520

Current US Cross Reference Classification (2):
358/522

Current US Cross Reference Classification (3):

382/168

Current US Cross Reference Classification (4):
382/264

Current US Cross Reference Classification (5):
382/274

Current US Cross Reference Classification (6):
382/298

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 9. Document ID: US 5905808 A

L2: Entry 9 of 22 File: USPT May 18, 1999

DOCUMENT-IDENTIFIER: US 5905808 A
TITLE: Method and apparatus for calibrating imaging systems for analyzing agglutination reactions

Brief Summary Text (17):
A further object of this invention is to provide a calibration cassette, which is used for analyzing solutions for agglutination patterns, with a photographic gray scale to determine and adjust the dynamic range of the imaging system, and with printed images of agglutination reactions to verify the system and the system software.

Brief Summary Text (19):
Preferably, the calibrating device includes printed images of different agglutination reactions and a photographic gray scale including a plurality of strips having different optical densities. The gray scale may be used to determine and adjust the dynamic range of the imaging system. The agglutination reaction images may be used to determine scan positions for the test cassettes and to verify the imaging equipment and the software of the image analysis system. The procedure and the calibration device of this invention can also be used in the regular quality control of the imaging system and to monitor the long term stability of the system.

Current US Original Classification (1):
382/128

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 10. Document ID: US 5872860 A

L2: Entry 10 of 22 File: USPT Feb 16, 1999

DOCUMENT-IDENTIFIER: US 5872860 A
TITLE: Calibration cassette for use in calibrating an automated agglutination reaction analyzing system

Brief Summary Text (14):
A further object of this invention is to provide a calibration cassette, which is used for analyzing solutions for agglutination patterns, with a photographic gray scale to determine and adjust the dynamic range of the imaging system, and with

printed images of agglutination reactions to verify the system and the system software.

Brief Summary Text (16):
Preferably, the calibrating device includes printed images of different agglutination reactions and a photographic gray scale including a plurality of strips having different optical densities. The gray scale may be used to determine and adjust the dynamic range of the imaging system. The agglutination reaction images may be used to determine scan positions for the test cassettes and to verify the imaging equipment and the software of the image analysis system. The procedure and the calibration device of this invention can also be used in the regular quality control of the imaging system and to monitor the long term stability of the system.

Current US Original Classification (1):
382/128

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments   KWIC | Draw Desc | Image

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☐ 11. Document ID: US 5796870 A

L2: Entry 11 of 22 File: USPT Aug 18, 1998

DOCUMENT-IDENTIFIER: US 5796870 A
TITLE: Method and apparatus for compressing dynamic ranges of images

Brief Summary Text (19):
In the region, such as the region in the vicinity of the edge of the artificial bone pattern, at which the image density changes sharply, the difference occurs in the value of the function f, which determines the rate of compression of the dynamic range. In such cases, density blurring occurs in the vicinity of the edge in the image, which is reproduced from the processed image signal Dproc having been obtained from the dynamic range compressing process, and an artifact is thereby formed. Therefore, the image quality of the reproduced image cannot be kept high.

Brief Summary Text (78):
iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Brief Summary Text (84):
iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate -determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Brief Summary Text (90):
iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Brief Summary Text (99):
iii) a dynamic range compressing operation means for carrying out a dynamic range

compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Dmor) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (4)

Brief Summary Text (105):
Accordingly, the function f(Lu) in Formula (1), which function determines the rate of compression of the dynamic range and is set in accordance with the unsharp mask signal Lu, take values close to the values of the function f(Lu), which is set in accordance with the original image signal Dorg. As a result, the occurrence of the density blurring in the vicinity of the image edge in the reproduced image can be reduced, and the formation of an artifact can be restricted.

Brief Summary Text (109):
Accordingly, the function f(Lu) in Formula (1), which function determines the rate of compression of the dynamic range and is set in accordance with the unsharp mask signal Lu, take values close to the values of the function f(Lu), which is set in accordance with the original image signal Dorg. As a result, the occurrence of the density blurring in the vicinity of the image edge in the reproduced image can be reduced, and the formation of an artifact can be restricted.

Brief Summary Text (113):
Accordingly, the function f(Lu) in Formula (1), which function determines the rate of compression of the dynamic range and is set in accordance with the unsharp mask signal Lu, take values close to the values of the function f(Lu), which is set in accordance with the original image signal Dorg. As a result, the occurrence of the density blurring in the vicinity of the image edge in the reproduced image can be reduced, and the formation of an artifact can be restricted.

Brief Summary Text (115):
Also, with the fourth method for compressing a dynamic range of an image in accordance with the present invention, the image edge, at which the density changes sharply, can be kept approximately perfectly. Therefore, the function f(Dmor), which determines the rate of compression of the dynamic range in Formula (4) and in which the morphology signal Dmor is utilized as the unsharp mask signal Lu, take values close to the values of the function f(Dmor), which is set in accordance with the original image signal Dorg. As a result, the occurrence of the density blurring in the vicinity of the image edge in the reproduced image can be reduced, and the formation of an artifact can be restricted.

Drawing Description Text (7):
FIG. 6 is a graph showing an example of a conversion table of a function f(Lu), which determines the rate of compression of a dynamic range and depends upon an image signal,

Drawing Description Text (8):
FIG. 7 is a graph showing a different example of a function f(Lu), which determines the rate of compression of a dynamic range,

Drawing Description Text (14):
FIG. 10 is a graph showing a further different example of a function f(Lu), which determines the rate of compression of a dynamic range, and

Drawing Description Text (15):
FIG. 11 is a graph showing a still further different example of a function f(Lu), which determines the rate of compression of a dynamic range.

Detailed Description Text (12):
The compression rate determining function storage means 46 stores information about a function f(Lu), which determines the rate of compression of the dynamic range and is shown in FIG. 6. In the function f(Lu), the unsharp mask signal Lu, which has been obtained from the unsharp mask signal calculating means 45, serves as a variable.

Detailed Description Text (15):
The function f(Lu), which determines the rate of compression of the dynamic range and is shown in FIG. 6, is a monotonously decreasing function, the value of which decreases monotonously as the value of the unsharp mask signal Lu (0.ltoreq.Lu.ltoreq.1,023) increases. The function f(Lu) is inclined along a straight line with respect to a region up to a point d (Lu.ltoreq.d). Also, the function f(Lu) takes a fixed number of zero with respect to the region larger than the point d (d<Lu).

Detailed Description Text (21):
Accordingly, the function f(Lu) in Formula (1), which function determines the rate of compression of the dynamic range and is set in accordance with the unsharp mask signal Lu, take values close to (in this embodiment, the same values as) the values of the function f(Lu), which is set in accordance with the original image signal Dorg. As a result, the occurrence of the density blurring in the vicinity of the image edge in the reproduced image (obtained with the dynamic range compressing process) can be reduced, and the formation of an artifact can be restricted.

Detailed Description Text (22):
As the function f(Lu), which determines the rate of compression of the dynamic range and is stored in the compression rate determining function storage means 46, in lieu of the function f(Lu) shown in FIG. 6, a function f(Lu) shown in FIG. 7 may be employed. The function f(Lu) shown in FIG. 7 is a monotonously decreasing function, the value of which decreases monotonously as the value of the unsharp mask signal Lu increases. The function f(Lu) shown in FIG. 7 takes a fixed number of zero with respect to the region of the unsharp mask signal Lu up to a point e (Lu.ltoreq.e) and is inclined along a straight line with respect to a region larger than the point e (e<Lu). In cases where the function f(Lu) shown in FIG. 7 is employed, the dynamic range in the region, in which the value of the unsharp mask signal Lu is large, i.e. in the region in which the mean image density is high, is compressed. Also, the contrast of fine image structures, which are constituted of comparatively high frequency components and are located in the respective image regions, can be kept in the state prior to the compression.

Detailed Description Text (23):
As another alternative, as the function f(Lu), which determines the rate of compression of the dynamic range, it is possible to employ a function, the value of which decreases monotonously as the value of the unsharp mask signal Lu increases, and in which the differential coefficient is continuous. For example, as illustrated in FIG. 10, it is possible to employ a monotonously decreasing function, the value of which decreases monotonously as the value of the unsharp mask signal Lu (0.ltoreq.Lu.ltoreq.1,023) increases. The function f(Lu) shown in FIG. 10 is inclined along a straight line with respect to a region up to a point immediately prior to a point d (Lu.ltoreq.d). Also, the function f(Lu) takes a fixed number of zero with respect to the region starting with a point slightly exceeding the point d (d<Lu). The line representing the function f(Lu) is not folded sharply at the point d, but the differential coefficient of the function f(Lu) is continuous.

Current US Original Classification (1):
382/232

Current US Cross Reference Classification (1):
382/128

CLAIMS:

25. An apparatus for compressing a dynamic range of an image, comprising:

i) an unsharp mask signal calculating means for calculating an unsharp mask signal Lu, which corresponds to super-low frequency, from an original image signal Dorg representing an original image,

ii) a compression rate determining function storage means for storing information about a function representing the rate of compression f(Lu), at which the dynamic range of the original image is compressed, the unsharp mask signal Lu, which has

been obtained from the unsharp mask signal calculating means, serving as a variable in the function f(Lu), and

iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Dproc=Dorg+f(Lu) (1)

a processed image signal Dproc being thereby obtained,

wherein the unsharp mask signal calculating means calculates, as the unsharp mask signal Lu, the mean value of the image signal values of all picture elements located within a rectangular unsharp mask having shorter sides, which extend across an edge of the region of interest in the original image, and longer sides extending in the direction along which the edge extends.

31. An apparatus for compressing a dynamic range of an image, comprising:

i) an unsharp mask signal calculating means for calculating an unsharp mask signal Lu, which corresponds to super-low frequency, from an original image signal Dorg representing an original image,

ii) a compression rate determining function storage means for storing information about a function representing the rate of compression f(Lu), at which the dynamic range of the original image is compressed, the unsharp mask signal Lu, which has been obtained from the unsharp mask signal calculating means, serving as a variable in the function f(Lu), and

iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Dproc=Dorg+f(Lu) (1)

a processed image signal Dproc being thereby obtained,

wherein the unsharp mask signal calculating means calculates, as the unsharp mask signal Lu, the mean value calculated from only the image signal values, which are among the image signal values of all picture elements located within an unsharp mask, that is set in order to obtain the unsharp mask signal Lu, and the differences of which from the image signal value of a middle picture element in the unsharp mask are not larger than a predetermined threshold value.

37. An apparatus for compressing a dynamic range of an image, comprising:

i) an unsharp mask signal calculating means for calculating an unsharp mask signal Lu, which corresponds to super-low frequency, from an original image signal Dorg representing an original image,

ii) a compression rate determining function storage means for storing information about a function representing the rate of compression f(Lu), at which the dynamic range of the original image is compressed, the unsharp mask signal Lu, which has been obtained from the unsharp mask signal calculating means, serving as a variable in the function f(Lu), and

iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Lu) for each of the picture elements, which rate

of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (1)

Dproc=Dorg+f(Lu) (1)

a processed image signal Dproc being thereby obtained,

wherein as for the image signal values, which are among the image signal values of all picture elements located within an unsharp mask, that is set in order to obtain the unsharp mask signal Lu, and the differences of which from the image signal value of a middle picture element in the unsharp mask are not larger than a predetermined threshold value, the image signal values are used directly as the image signal values for the calculation of the unsharp mask signal Lu,

as for the image signal values, which are among the image signal values of all picture elements located within the unsharp mask, and the differences of which from the image signal value of the middle picture element in the unsharp mask are larger than the predetermined threshold value, the predetermined threshold value is used as the image signal values for the calculation of the unsharp mask signal Lu, and

the unsharp mask signal calculating means calculates, as the unsharp mask signal Lu, the mean value calculated from the image signal values for the calculation of the unsharp mask signal Lu.

43. An apparatus for compressing a dynamic range of an image, comprising:

i) a morphology signal operation means for carrying out a morphology operation on an original image signal Dorg, which represents an original image, the morphology operation being carried out with Formula (2) or Formula (3) by using a structure element Bi, which is larger than a spatial fluctuation range of image signal values corresponding to an image portion representing an unnecessary tissue or noise in the original image, and a scale factor .lambda., a morphology signal Dmor, which is represented by Formula (2) or Formula (3), being obtained from the morphology signal operation means, ##EQU9## wherein the expression X .crclbar. .lambda.Y represents that .lambda. times of calculations for finding the Minkowski difference are carried out with the structure element Y on the image signal X, and the expression X .sym. .lambda.Y represents that .lambda. times of calculations for finding the Minkowski sum are carried out with the structure element Y on the image signal X, ##EQU10## wherein the expression X .sym. .lambda.Y represents that .lambda. times of calculations for finding the Minkowski sum are carried out with the structure element Y on the image signal X, and the expression X .crclbar. .lambda.Y represents that .lambda. times of calculations for finding the Minkowski difference are carried out with the structure element Y on the image signal X,

ii) a compression rate determining function storage means for storing information about a function representing the rate of compression f(Dmor), at which the dynamic range of the original image is compressed, the morphology signal Dmor, which has been obtained from the morphology signal operation means, serving as a variable in the function f(Dmor), and

iii) a dynamic range compressing operation means for carrying out a dynamic range compressing process with respect to each of picture elements in the original image, by using the rate of compression f(Dmor) for each of the picture elements, which rate of compression is obtained in accordance with the function stored in the compression rate determining function storage means, the dynamic range compressing process being carried out with Formula (4)

Dproc=Dorg+f(Dmor) (4)

a processed image signal Dproc being thereby obtained.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Drawu Desc | Image

☐ 12. Document ID: US 5790701 A

L2: Entry 12 of 22 File: USPT Aug 4, 1998

DOCUMENT-IDENTIFIER: US 5790701 A
TITLE: Character recognition apparatus using edge images

Detailed Description Text (34):
In that case, in the processing at the direction feature vector creating circuit 8, the process based on the flowchart shown in FIG. 9 may be used, instead of the above-described flowchart in FIG. 7. Specifically, steps S21 to S24 are the same processes as those in FIG. 7 and furthermore, added with a dynamic range adjusting process at step S25. In the dynamic range adjusting process, after the direction feature vectors have been created at step S24, the maximum value MAX--V of the vector values is determined and adjusted to a predetermined dynamic range MAX.sub.-- D. Both of MAX.sub.-- V and MAX.sub.-- D are positive numbers. The calculation is done by multiplying each vector value by MA.sub.-- D and then dividing each result by MAX.sub.-- V. By doing this, errors due to disregarding fractions are less than "1".

Current US Original Classification (1):
382/205

Current US Cross Reference Classification (1):
382/197

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Drawu Desc | Image

☑ 13. Document ID: US 5745173 A

L2: Entry 13 of 22 File: USPT Apr 28, 1998

DOCUMENT-IDENTIFIER: US 5745173 A
TITLE: Machine vision camera and video preprocessing system

Detailed Description Text (3):
The pulse train is provided to de-interleave circuitry 24, which separates the pulse train into its corresponding infrared, visible, and ultraviolet components. The de-interleave logic 24 has three outputs that are provided to three dynamic range transform (DRT) circuits 26, 28, and 30, as shown. The de-interleave circuitry 24 provides infrared pulses to the DRT circuit 26, provides the pulses corresponding to the visible portion of the image to the DRT circuit 28, and provides the ultraviolet pulses to the DRT circuit 30. Each respective dynamic range transform circuit adjusts the dynamic range of each of the respective signals to selectively compress the dynamic range of each of the signals. By selectively compressing the dynamic range of each of these signals in this manner, a reduced number of bits are required to convey the information comprising the image.

Detailed Description Text (6):
The CCD grid 22 outputs a pulse train to DRT logic 26 which adjusts the dynamic range of each of the respective signals to selectively compress the dynamic range of each of the signals as described above. The DRT logic 26 provides its output to a single channel A/D converter 36 which in turn provides a digital output to the motion compensation logic 50. The A/D converter 36 is preferably the Bt252 produced

by Brooktree. The output image from the motion compensation logic is then provided to a machine vision processing system (not shown).

Current US Cross Reference Classification (3):
382/270

Current US Cross Reference Classification (4):
382/274

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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14. Document ID: US 5513282 A

L2: Entry 14 of 22 File: USPT Apr 30, 1996

DOCUMENT-IDENTIFIER: US 5513282 A
TITLE: Method and apparatus for controlling the processing of digital image signals

Brief Summary Text (21):
The bit positions for the window effects are significant in the conventional system. For example, a first bit position DO may determine whether the dynamic range adjustment will be carried out on all image signals lying within a tile. Similarly, a second bit position D1 may control the application of a tonal-reproduction-curve (TRC) adjustment operation. Third and fourth bit positions D2 and D3 may be determinative of the masking operation to be employed on the video signal. A fifth bit position D4 may control the application of a moire reduction process to the video signals to eliminate aliasing caused by scanning of an original document with periodic structures (e.g., halftone patterns). Thus, in this conventional system, the controlling of the image processing operations is strictly dependent on the binary (logic) value residing in a single bit or field.

Current US Original Classification (1):
382/303

Current US Cross Reference Classification (1):
358/448

Current US Cross Reference Classification (2):
358/453

Current US Cross Reference Classification (3):
382/173

Current US Cross Reference Classification (4):
382/302

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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15. Document ID: US 5390029 A

L2: Entry 15 of 22 File: USPT Feb 14, 1995

DOCUMENT-IDENTIFIER: US 5390029 A
TITLE: Method for controlling the processing of digital image signals

Detailed Description Text (23):
As shown by FIG. 6, bit position DO determines whether the dynamic range adjustment will be carried out on all image signals lying within a tile. Typically, this adjustment would remap the input video signal to modify the range of the output video signal. Using Window Effect #1, as an example again, at bit DO of address 22h, the binary value shown in Table B1 is a zero. Therefore, all tiles having pointers to Window Effect #1 will have no dynamic range adjustment applied to the video signals within the boundaries of the tile. Similarly, in bit position D1, the window effects memory in FIG. 6 controls the application of a tonal reproduction curve (TRC) adjustment operation. In general, this operation would be used to shift the relationship, or mapping, between an input video signal and an output video signal.

Current US Original Classification (1):
358/448

Current US Cross Reference Classification (1):
358/443

Current US Cross Reference Classification (2):
358/453

Current US Cross Reference Classification (3):
382/173

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 16. Document ID: US 5359676 A

L2: Entry 16 of 22 File: USPT Oct 25, 1994

DOCUMENT-IDENTIFIER: US 5359676 A
TITLE: Decompression of standard ADCT-compressed document images

Current US Original Classification (1):
382/246

Current US Cross Reference Classification (1):
382/260

CLAIMS:

1. A method of improving the appearance of a decompressed document image while maintaining fidelity with an original document image from which it is derived, wherein for compression, an original document image is divided into blocks of pixels, said blocks of pixels are changed into blocks of transform coefficients by a forward transform coding operation using a frequency space transform operation, said transform coefficients subsequently quantized with a lossy quantization process in which each transform coefficient is quantized according to a quantizing value from a quantization table and the result is used as a quantized transform coefficient, the method including the decompression steps of:

a) receiving said quantized transform coefficient blocks for said original image;

b) dequantizing the transform coefficients in a block according to a corresponding quantizing value from the quantization table to obtain a block of received transform coefficients;

c) recovering the image by applying an inverse transform operation to the received transform coefficients and producing blocks of pixels;

d) filtering the image with a non-linear filter, said filtering step including the substeps of:

i. for each block of pixels, determining the dynamic range of the pixel block,

ii. calculating, for each block of pixels, an edge threshold value, as a function of the dynamic range determined for the pixel block;

iii. locating, using the edge threshold value, edges of the image within the block and producing therefrom an edge map;

iv. filtering the image with a sigma filter, averaging pixel values in the block which are not identified as edges in the edge map;

e) changing the filtered recovered image into blocks of new transform coefficients by the forward transform coding operation using the frequency space transform compression operation;

f) comparing each block of new transform coefficients to a corresponding block of received transform coefficients and the selected quantization table, to determine whether the filtered recovered image is derivable from the original image; and

g) upon a positive determination transferring the filtered recovered image to an output buffer.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 17. Document ID: US 5307180 A

L2: Entry 17 of 22 File: USPT Apr 26, 1994

DOCUMENT-IDENTIFIER: US 5307180 A
TITLE: Method and apparatus for controlling the processing of digital image signals

Detailed Description Text (24):
As shown by FIG. 6, bit position D0 determines whether the dynamic range adjustment will be carried out on all image signals lying within a tile. Typically, this adjustment would remap the input video signal to modify the range of the output video signal. Using Window Effect #1, as an example again, at bit D0 of address 22h, the binary value shown in Table B1 is a zero. Therefore, all tiles having pointers to Window Effect #1 will have no dynamic range adjustment applied to the video signals within the boundaries of the tile. Similarly, in bit position D1, the window effects memory in FIG. 6 controls the application of a tonal reproduction curve (TRC) adjustment operation. In general, this operation would be used to shift the relationship, or mapping, between an input video signal and an output video signal.

Current US Original Classification (1):
358/448

Current US Cross Reference Classification (1):
358/443

Current US Cross Reference Classification (2):
358/453

Current US Cross Reference Classification (3):
382/282

☐ 18. Document ID: US 5268774 A

L2: Entry 18 of 22 File: USPT Dec 7, 1993

DOCUMENT-IDENTIFIER: US 5268774 A
TITLE: Halftoning with enhanced dynamic range and edge enhanced error diffusion

Current US Original Classification (1):
358/466

Current US Cross Reference Classification (1):
358/445

CLAIMS:

19. The arrangement as defined in claim 18, wherein the enhancement factor K is selected to be greater than or equal to the dynamic range of the set of adjusted threshold values.

24. The method as defined in claim 23, wherein the enhancement factor K is selected to be greater than or equal to the dynamic range of the set of adjusted threshold values.

34. The arrangement as defined in claim 33, wherein the enhancement factor K is selected to be greater than or equal to the dynamic range of the set of adjusted threshold values.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

☐ 19. Document ID: US 5187747 A

L2: Entry 19 of 22 File: USPT Feb 16, 1993

DOCUMENT-IDENTIFIER: US 5187747 A
TITLE: Method and apparatus for contextual data enhancement

Brief Summary Text (22):
Again yet a further feature of the present invention is the enhancement of the intensity data in a data element by comparing that data element with a third scan window containing enhanced direction data and intensity data. If the center data element in the window has an assigned direction other than "no direction," then the mean intensity within the scan window is compared to the dynamic range within the window. If the mean intensity is equal to or greater than a selected percentage of the dynamic range, then the mean intensity is adjusted by the addition of a constant value. If, instead, the mean intensity is equal to or less than a smaller percentage of the dynamic range, then the mean value is adjusted by the subtraction of a fixed constant.

Current US Original Classification (1):
382/124

Current US Cross Reference Classification (1):
382/197

Current US Cross Reference Classification (2):
382/270

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 20. Document ID: US 5049990 A

L2: Entry 20 of 22 File: USPT Sep 17, 1991

DOCUMENT-IDENTIFIER: US 5049990 A
TITLE: Highly efficient coding apparatus

Current US Cross Reference Classification (1):
358/1.9

CLAIMS:

7. A highly efficient coding apparatus according to claim 1; wherein said means for determining the bit number includes means for generating a distribution table of said modified dynamic range information during said predetermined period, setting means for setting a threshold value of the modified dynamic range information for determining a boundary between plural bit numbers, and comparator means for comparing said modified dynamic range information and said threshold value.

10. A highly efficient coding apparatus according to claim 1; wherein said first averaging means includes n averaging devices each of which averages the digital video data having a value between said maximum value and a value lower than said maximum value by original dynamic range information generated from said maximum and minimum values divided by 2.sup.i (i =1, 2, . . . n), said averaging means generating n modified maximum values; said second averaging means includes n averaging devices each of which averages the digital video data having a value between said minimum value and a value higher than said minimum value by said original dynamic range information divided by 2.sup.i (i=1, 2, . . . n), said second averaging means generating n modified minimum values' said maens for generating modified dynamic range information generates n modified dynamic range informations; and said means for determining said encoding bit number includes means for generating n distribution tables from said n modified dynamic range information, setting means for setting a threshold value of the modified dynamic range information for determining a boundary between plural bit numbers, and comparator means for comparing said n modified dynamic range informations and said threshold value.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 21. Document ID: US 4876726 A

L2: Entry 21 of 22 File: USPT Oct 24, 1989

DOCUMENT-IDENTIFIER: US 4876726 A
TITLE: Method and apparatus for contextual data enhancement

Brief Summary Text (22):

Again yet a further feature of the present invention is the enhancement of the intensity data in a data element by comparing that data element with a third scan window containing enhanced direction data and intensity data. If the center data element in the window has an assigned direction other than "no direction," then the mean intensity within the scan window is compared to the dynamic range within the window. If the mean intensity is equal to or greater than a selected percentage of the dynamic range, then the mean intensity is adjusted by the addition of a constant value. If, instead, the mean intensity is equal to or less than a smaller percentage of the dynamic range, then the mean value is adjusted by the subtraction of a fixed constant.

Current US Original Classification (1):
382/124

Current US Cross Reference Classification (1):
382/197

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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☐ 22. Document ID: US 4710811 A

L2: Entry 22 of 22 File: USPT Dec 1, 1987

DOCUMENT-IDENTIFIER: US 4710811 A
TITLE: Highly efficient coding apparatus for a digital video signal

Current US Cross Reference Classification (1):
358/1.9

CLAIMS:

2. A highly efficient coding apparatus according to claim 1, wherein said means for encoding includes a priority encoder supplied with said dynamic range information and being operative to generate encoded data with a smaller number of bits than the number of bits in said dynamic range information and a bit selector supplied with said modified digital video data and being operative for selecting a predetermined number of bits of said modified digital video data, said predetermined number being determined in response to said priority encoder.

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | KWIC | Draw Desc | Image

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